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AUTHOR Frankel, Fred; And Others
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ABSTRACT

Current emphasis on individual educational plans for handicapped children presents a problem of matching one child's educational plan with that of other children and then grouping several such children together for instruction, such that the individual qualities of each child's program are still maintained. Teacher and child variables in a noncategorical program for early childhood education of retarded, autistic, seriously disturbed, learning disabled, and aphasic children were used to generate monthly computerized schedules of instruction for 12 to 16 children each month over an eight-month period. A sample schedule is presented to illustrate the discussion of the advantages and feasibility of such a system. (Author/STS)

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INDIVIDUALIZING SCHEDULES OF INSTRUCTION FOR HANDICAPPED SCHOOL CHILDREN

by

Fred Frankel
Steven R. Forness
Sharon L. Rowe
Joan Westlake

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INDIVIDUALIZING SCHEDULES OF INSTRUCTION FOR HANDICAPPED SCHOOL CHILDREN [1]

Fred Frankel, Ph.D.
Steven R. Forness, Ed.D.
Sharon L. Rowe, M.A.
Joan Westlake, Ph.D.

University of California at Los Angeles

ABSTRACT

Current emphasis on individual educational plans for handicapped children presents a problem of matching one child's educational plan with that of other children and then grouping several such children together for instruction, such that the individual qualities of each child's program are still maintained. Teacher and child variables in a noncategorical program for early childhood education of retarded, autistic, seriously disturbed, learning disabled and aphasic children were used to generate monthly computerized schedules of instruction for 12-16 children each month. Schedules were generated over a eight-month period, and the last month's weekly schedule was presented for purposes of illustration and discussion. Advantages and feasibility of such a system were discussed.

[1] Presented at American Association on Mental Deficiency Annual Meeting, Denver, May, 1978

INDIVIDUALIZING SCHEDULES OF INSTRUCTION FOR HANDICAPPED SCHOOL CHILDREN

Authors' Background

FRED FRANKEL is an adjunct assistant professor in the UCLA Mental Retardation and Child Psychiatry Program. He received his Ph.D. in experimental psychology from University of California at Irvine in 1971 and served as a research associate at Rockefeller University in New York City for two years before coming to UCLA. He has published several papers on retardate memory, stereotypic behavior of autistic children, and aversive procedures in classroom and ward settings. STEVE FORNESS is a professor in residence, UCLA Mental Retardation and Child Psychiatry Program, and principal of the NPI School. He taught high school for two years before receiving his Ed.D. from UCLA in 1968, has published several papers in special education and is collaborating author on an introductory text in the field. SHARON ROWE is an associate demonstration teacher in the UCLA Neuropsychiatric Institute. She recently received her M.A. from California State University, Los Angeles, has taught for the past four years in the NPI early childhood program, and supervises UCLA practicum students. JOAN WESTLAKE is an assistant research biomathematician and a member of the computing resources group, UCLA Mental Retardation and Child Program. She received her Ph.D. in mathematics from Bryn Mawr in 1952 and worked for IBM before coming to UCLA. She has published several technical papers and is the author of a text on numerical matrix inversion.

INDIVIDUALIZING SCHEDULES OF INSTRUCTION FOR HANDICAPPED SCHOOL CHILDREN[1]

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University of California at Los Angeles

With increased demand for individualized educational programming of handicapped children, it is apparent that alternatives are needed to the traditional practice of categorical grouping in special education (Filler, Robinson, Smith, Vincent-Smith and Bricker 1975; Martin 1976). The heterogeneity of children within a single diagnostic category has been well-established (Foster, Ysseldyke and Reese 1975; Grady 1974; Lombardi 1975; and Smith 1974) and has served to disabuse special educators of reliance on categorical programs. Several approaches to non-categorical systems have evolved (Forness 1976 , Hewett 1977, Iscoe 1962 and Quay 1968), but the difficulties of actual day-to-day programming in such systems have not been explored.

Determining a handicapped child's individual needs for certain educational activities may prove to be a relatively simple matter. The difficulty lies in matching one child's individual educational program with that of other children and then grouping several such children together for purposes of instruction such that the individual qualities of each child's program are still maintained. It is evident that an entire range of classroom settings should be made availble to any group of handicapped children so that individual needs for instruction can be met more efficiently (MacMillan, Jones and Meyers, 1976). Individual rates of progress may also dictate that placement in

different levels of instructional settings be modified more frequently for some children than for others. Preliminary study (Frankel 1976; Frankel and Graham 1976) suggests that effectiveness of an instructional setting is also a function of the type of activity involved and that some children may require more intense individual instruction in some task areas but not in others. The same may be true for the type of consequences required to motivate each child, with some children requiring certain reinforcers in some situations but not in others (Forness 1973, 1978; Whelan and Haring 1966). All such variables need to be included in an individual child's program, but matching a number of children who have different needs and levels of functioning may prove problematic. This may be especially true in small or isolated school districts (Erdman, Wyatt and Heller 1970) or in larger districts where prevalence of handicapped children is not evenly distributed.

In the present study an ongoing analysis was made of the classroom characteristics and scheduling needs of a group of handicapped children in a non-categorical school program (Forness, 1977) and a computer program was developed which grouped different types of children together for individual instruction.

METHOD

Setting

The Neuropsychiatric Institute (NPI) School is an inpatient school for children hospitalized on four wards of the Mental Retardation and Child Psychiatry Program at UCLA. Children are admitted at various times throughout the year for an average of four to five months for short-term treatment and extended observation. Length of admission ranges from approximately one

month to over a year in some cases. Children attend school for two one-hour periods in the morning and a third period in the afternoon. While the school is only one component of a program of coordinated interdisciplinary treatment, it does provide the total range of activities available to children in comparable public school special education programs.

The NPI School program has evolved into a non-categorical program over recent years (Hewett 1967; Forness and Langdon 1974) and is currently based on a model in which each child's program is based on his or her readiness to function in a classroom setting (Forness, 1977). Readiness is determined along six dimensions: developmental or academic level, type of curriculum materials required, type of teacher input and pupil response modalities, instructional setting, level of reinforcing and level of aversive consequences. These dimensions begin at basic levels of functioning characteristic of many young children in residential or special day school settings, e.g., preschool developmental levels with individually designed materials requiring motor responses in one-to-one (teacher-to-child) situations using token reinforcers and time-out procedures. The dimensions range from these basic levels up through levels characteristic of older children in regular classroom settings, e.g., academic subjects with regular textbooks in large-group situations with minimal reliance on external consequences.

Subjects

The school is divided into four units: early childhood, elementary, intermediate, and secondary. The early childhood program was the focus of the present study because it serves a broad range of handicapped children represented across several ages. The early childhood program contains approximately 12-16 children ranging in age from 2 to 12 years who are functioning at preschool and kindergarten levels. Over the course of the

year, there were more than 40 different children who were served, representing the following diagnostic categories: severely mentally retarded (SMR), educable and trainable mentally retarded (EMR and TMR), learing disabled, behavior disordered, autistic, severely emotionally disturbed (SED), and aphasic. All had serious problems in classroom adjustment and behavior.

Teaching Staff and Classroom Areas

There were four credentialed teachers in the early childhood program over the course of the study, two of whom were demonstration teachers with additional responsibilities for which they were released part-time from classroom teaching duties. There were also two part-time assistant teachers, who worked under the direction of the teachers. As part of an introductory undergraduate practicum course at the university, there were also some five to ten trainees who each worked five hours per week in the classrooms under the supervision of school staff, plus some six to eight student volunteers who had completed the practicum and were slightly more experienced. For purposes of computer scheduling, people in each of these groups were assigned a number based on their experience: 1 - introductory students, 2 - experienced volunteers, 3 - staff. Their schedules of available teaching hours each week were also entered on the computer scheduling sheet each month.

Four classrooms were available for the early childhood program (400 to 600 square feet each). These rooms were further divided into a dozen identified areas, by movable room dividers and storage cabinets, to form various one-to-one, small, and large group teaching settings. Each area was assigned an identifying name and a code number. This was entered on the schedule program, along with the maximum number of children each area could accommodate.

Child Performance Variables

Shortly after each child's admission to an inpatient ward, an NPI teacher evaluated the child, during one or more sessions, in fifteen skill areas related to preschool and kindergarten functioning: gross motor, fine motor, puzzles, blocks, drawing or writing, general concepts, color concepts, number concepts, body image, matching skills, visual memory, auditory memory, expressive language, receptive language, and play or socialization skills. Items were drawn from widely used developmental and intelligence tests, and specific tasks at each level are described in Flaharty (1976) and Richey (1976). For each child, the lowest of the 15 areas (ranging from 3 to 6 areas for each child) were coded along with the child's developmental level in each area (ranging from 1 to 72 months). These were further weighted by the estimated amount of time each child needed to spend on the particular subject (either for 15 minutes in a half-hour session or for the entire 30 minute session).

An assessment was also made, at the initial evaluation, of the child's level of maladaptive behaviors. This was coded as follows: 1-mild, 2-moderate, 3-severe. As estimate of the maximum group size the child could tolerate was also made and coded (from 1 to 8 children).

Procedures

At tha' point, each child was programmed for instruction over the three-hour school day, each hour of which was divided into two 15-minute and one 30-minute segments of instruction. Instructional settings, during the first two 15-minute segments, ranged from one-to-one instruction to small groups of 2 or 3 children or larger groups of 4 to 8 children. The last 30 - minute segment of each hour was devoted to supervised play skills and peer socialization in large groups which were not programmed by

computer but were arranged according to various play levels, e.g. solitary, parallel, associative, and cooperative play. Thus only the first half-hour "academic" segments of each period were the focus of the computer schedule program which follows.

Each child was evaluated once again in the 15 skill areas and classroom behavior at the end of the first month and every month thereafter until discharge. All children were re-scheduled during the first week of every month as a result of their monthly re-evaluation. These results, teacher availability schedules, and practicum student schedules were then entered on the computer scheduling sheets. The primary factors which were used to determine the total early childhood program schedule each month were as follows: availability of teaching staff relative to total number of children, continuity of settings such that each child had the same teachers and room assignments throughout each week, availability of rooms or cubicles appropriate to instructional settings, level of experience of teacher or assistant teacher, assignment of children with serious language deficiencies to language programs during early morning periods, grouping of children during each segment by the same area from among the 15 skill areas, grouping of children as much as possible with the same level of deficit in that skill area in each segment. The secondary factors, which were considered whenever possible, were as follows: continuity of settings such that each child had the same teachers and room assignments from one monthly schedule to the next, assignment of each child to his or her "primary" teacher (who had responsibility for communication with parents, etc.) at least once a day, balanced assignment of staff teachers such that each taught one group setting and one one-to-one setting whenever possible each day, and assignment of less experienced teachers to children with mild or moderate (as opposed to severe) classroom beahvior problems.

Computer Schedules

The UCLA Health Sciences Computer was used to prepare the monthly schedules. Data was entered directly from the raw computer scheduling sheets. SAS procedures (Barr, Goodright, Sall, and Helwig, 1977) were used to develop a program which sorted variables in the following areas: (1) behavior rating of each child and his or her "academic" subjects to be taken, together with developmental levels in each subject, time needed for each subject, maximum group size, and classroom behavior rating; (2) groups of children having in common: similar behavior ratings, common "academic" subjects, similar developmental levels in each subject, maximum size of group, and common time slots available; (3) rooms available for each group by capacity and time slots available; (4) teacher availability by level of experience.

Monthly computer programs were generated over an eight-month period from September 1977 to April 1978. Computer-generated schedules were compared with ongoing informal teacher-prepared schedules each month. Teacher-prepared schedules had been used solely for the early childhood program for two years prior to this study. They were prepared by two different staff teachers each month on a rotating basis, such that each of the six staff members (teachers and assistant teachers) had co-responsibility for scheduling over the course of the study.

Based on data collected for 12 months prior to the beginning of the study, the average time required to develop teacher-prepared schedules each month was approximately 14.5 hours, the total for both teachers (range from 11 to 16 hours). During the current study, teacher-prepared schedules were the standard against which computer-generated schedules were validated and revised on a monthly basis. By the fourth month of the study, computer-generated programs began to require minimal revision (i.e., more closely resembled teacher prepared schedules). At that point, only computer-generated schedules were used. Total amount of teacher time needed to program computer-generated schedules, over the last four months, averaged less than two-hours per month.

Tables 1 through 3 are taken directly from print-outs of the computer-generated schedule for each of the three school periods during the last month of the study (April 1978). During each hourly period, the computer

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INSERT TABLES 1, 2, AND 3 ABOUT HERE

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generated one group of four children who remained together during the entire day. This comprised a self-contained "kindergarten" group. In this regard it should be mentioned that, in previous months, this group also had one or two additional members (subsequently discharged from the hospital) who joined the group for only one or two periods a day. The remainder of the children each tended to require a one-to-one teaching situation during the first period, because of the idiosyncratic nature of their deficits or their classroom behavior; but some of these children were able to be grouped together during subsequent periods. Although 11 different teaching situations were needed the first hour, only 9 and 7

respectively were required during the other two periods. Note that the small groups were constituted with different children at different periods. Note also the diversity of diagnostic categories which were represented in each group throughout the day.

DISCUSSION

The feasibility of computer-generated schedules for public school settings, as well as the generalizability of such a procedure to classroom settings other than the present one, have yet to be determined. The exact classroom requirements of handicapped children in non-categorical public school settings needs further scrutiny (Becker, 1978). Although there was seemingly an inordinate amount of 1:1 and small group situations generated in the present study, it should be noted the high ratio of teachers to pupils was largely a function of using unpaid and largely untrained personnel. The university students who served as teachers were taking only their second course in special education, a beginning practicum which was designed as a career exploration and an introductory experience to the field of exceptional children. One-to-one teaching situations were generated, at least in part, to accomodate the training needs of these university students.

In this regard, it should be noted that there were several occasions throughout each week when only one or two paid staff were actually assigned to teach during an hour. It might be argued that this was made possible in part by careful computer programming, scheduling, and matching of teacher and child variables, which led to a more effective and efficient use of unpaid teacher aides. This in turn left other paid staff free, on several occasions, to attend to such other matters as meetings and communication with parents or other professionals, clinical supervision of university students, evaluation of incoming children, monitoring of each child's progress,

developing individual educational plans, and a host of other duties which increasingly fill a teacher's day under Public Law 94-142. Since the use of teacher aides or volunteers has a number of financial and clinical advantages (Forness, 1974), any system which enhances the utility of such personnel has merit.

While the relative cost of computer systems may seem prohibitive to some, the equally high cost of highly paid credentialed teachers to perform routine teaching and scheduling duties, plus the recent availability of remote computer terminals, may warrant further consideration of computer-generated schedules of instruction. Such a system may be seen even more favorably in larger special education settings, such as special day schools or prescriptive-diagnostic centers, where large numbers of individual educational programs need to be coordinated. The same may be true in situations where children remain in the same program for longer than a four or five month period, characteristic of children in the present study, and where re-scheduling may only need to be done on a quarterly basis.

Though not unique to this setting, the idea of further connecting computer-generated schedules directly to curriculum selection for individual children has considerable potential. The present system, of course, needs further refinement before that point. It is interesting that an additional computer-scheduling variable recently suggested by our teaching staff deals with an intangible but nonetheless important factor, i.e., the perceived affinity or attraction which the teacher has for an individual child. As this factor has been described, it seems honestly to be independent of such factors as age, appearance, diagnosis, functioning level, or classroom behavior. However a school chooses to define its computer scheduling parameters, any system such as the present one, which more quickly and

readily takes individual child variability and progress into account, has manifest advantages.

Footnote

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TABLE 1

INSTRUCTIONAL GROUPS OF CHILDREN IN EARLY CHILDHOOD PROGRAM (9 O'CLOCK PERIOD)

Child* (age, diagnosis)	Assigned teacher for each day, experience level					Teaching area #	Subject for 1st 15 minutes (level in months)	Subject for 2nd 15 minutes (level in months)
	Monday	Tuesday	Wednesday	Thursday	Friday			
Mark (8 yrs, SED)	Debbie 3	Debbie 3	Debbie 3	Debbie 3	Debbie 3	1	numbers (72)	
Sally (6 yrs, behavior disorder)							numbers (80)	
Tom (7 yrs, learning disabled)							numbers (78)	
Mike (6 yrs, SED)							numbers (76)	
Greg (6 yrs, autistic)	Dana 1	Dana 1	Dana 1	Dana 1	Dana 1	2	writing (72)	body image (48)
Luke (4 yrs, autistic)	Susan 1	Joleen 1	Susan 1	Joleen 1	Susan 1	3	blocks (48)	body image (42)
Melinda (3 yrs, TMR)	Doreen 1	Maureen 2	Doreen 1	Maureen 2	Doreen 1	4	gross motor (21)	blocks (27)
Alec (6 yrs, EMR)	Diane 1	Lorraine 3	Diane 1	Lorraine 3	Diane 1	5	gross motor (45)	concepts (54)
Jack (4 yrs, autistic)	Karen 1	Donna 2	Karen 1	Donna 2	Karen 1	6	gross motor (24)	fine motor (30)
Al (5 yrs, autistic)	Mark 1	Sharon 3	Mark 1	Sharon 3	Mark 1	7	gross motor (46)	body image (60)
Jim (8 yrs, TMR)	Phyllis 2	Phyllis 2	Phyllis 2	Phyllis 2	Phyllis 2	8	auditory memory (70)	gross motor (58)
Don (12 yrs, SMR)	Jamie 2	Jamie 2	Jamie 2	Jamie 2	Jamie 2	9	visual memory (36)	gross motor (28)
Pete (3 yrs, aphasic)	Rick 2	Ellen 3	Rick 2	Ellen 3	Rick 2	10	auditory memory (42)	
Steve (4 yrs, autistic)	Becki 3	Becki 3	Becki 3	Becki 3	Becki 3	11	language (40)	

*Alias names have been used to protect confidentiality

TABLE 2

INSTRUCTIONAL GROUPS OF CHILDREN IN EARLY CHILDHOOD PROGRAM (10 O'CLOCK PERIOD)

Child* (age, diagnosis)	Assigned teacher for each day, experience level					Teaching area #	Subject for 1st 15 minutes (level in months)	Subject for 2nd 15 minutes (level in months)
	Monday	Tuesday	Wednesday	Thursday	Friday			
Mark (8 yrs, SED)	Sari 3	Sari 3	Sari 3	Sari 3	Sari 3	1	reading (64)	
Sally (6 yrs, behavior disorder)							reading (82)	
Tom (7 yrs, learning disabled)							reading (76)	
Mike (6 yrs, SED)							reading (66)	
Greg (6 yrs, autistic)	Susan 1	Joleen 1	Susan 1	Joleen 1	Susan 1	2	auditory memory (48)	concepts (42)
Al (5 yrs, autistic							auditory memory (48)	concepts (46)
Luke (4 yrs, autistic)	Doreen 1	Gina 2	Doreen 1	Gina 2	Doreen 1	3	auditory memory (36)	drawing (58)
Alec (6 yrs, EMR)							auditory memory (30)	drawing (60)
Melinda (3 yrs, TMR)	Karen 1	Maureen 2	Karen 1	Maureen 2	Karen 1	5	drawing (18)	concepts (18)
Jack (4 yrs, autistic)	Debbie 3	Debbie 3	Ethel 1	Ethel 1	Ethel 1	7	blocks (18)	drawing (27)
Jim (8 yrs, TMR)	Diane 1	Donna 2	Diane 1	Donna 2	Diane 1	4	concepts (60)	colors (60)
Don (12 yrs, SMR)	Mark 1	Sharon 3	Mark 1	Sharon 3	Mark 1	6	auditory memory (30)	concepts (36)
Peter (3 yrs, aphasic)	Jamie 2	Jamie 2	Jamie 2	Jamie 2	Lorraine 3	8	number concepts (42)	
Steve (4 yrs, autistic)	Mike 2	Debbie 3	Debbie 3	Sari 3	Mike 2	4	number concepts (61)	

*Alias names have been used to protect confidentiality

TABLE 3

INSTRUCTIONAL GROUPS OF CHILDREN IN EARLY CHILDHOOD PROGRAM (1 O'CLOCK PERIOD)

Child* (age, diagnosis)	Assigned teacher for each day, experience level					Teaching area #	Subject for 1st 15 minutes (level in months)	Subject for 2nd 15 minutes (level in months)
	Monday	Tuesday	Wednesday	Thursday	Friday			
Mark (8 yrs, SED)	Becki 3	Becki 3	Becki 3	Becki 3	Becki 3	1		Concepts (72)
Sally (6 yrs, behavior disorder)								Concepts (82)
Tom (7 yrs, learning disabled)								Concepts (78)
Mike (6 yrs, SED)								Concepts (75)
Greg (6 yrs, autistic)	Jeff 1	Jeff 1	Jeff 1	Jeff 1	Jeff 1	4	fine motor (60)	numbers (72)
Al (5 yrs, autistic)							fine motor (58)	numbers (66)
Don (12 yrs, SMR)							fine motor (60)	numbers (36)
Luke (4 yrs, autistic)	Glenda 1	Glenda 1	Glenda 1	Glenda 1	Glenda 1	3		Concepts (42)
Peter (3 yrs, aphasic)								Concepts (46)
Alec (6 yrs, EMR)	Ellen 3	Ellen 3	Ethel 1	Ethel 1	Ethel 1	2	fine motor (60)	numbers (45)
Jim (8 yrs, TMR)							fine motor (60)	numbers (48)
Melinda (3 yrs, TMR)	Sharon 3	Sharon 3	Joleen 1	Sharon 3	Joleen 1	5	colors (30)	body image (12)
Jack (4 yrs, autistic)	Mike 2	Gina 2	Mike 2	Gina 2	Gina 2	6	concepts (18)	body image (12)
Steve (4 yrs, autistic)	(mornings only)							

*Alias names have been used to protect confidentiality